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# **Does the conventional benchmark prop up non-performing loans in Islamic banks? A case study of Malaysia with ARDL Approach**

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# **Does the conventional benchmark prop up non-performing loans in Islamic banks? A case study of Malaysia with ARDL Approach**

Shinaj Valangattil Shamsudheen<sup>1</sup> and Mansur Masih<sup>2</sup>

## **Abstract**

Non-performing loan rate is one of the most significant issues for the banks to survive. The key motivation of this study is the profound statement that “Islamic banks are free from interest rates” and it is indeed to check the validity of this statement in the area of Non-performing loan rate. The principal objective of this study is to examine the short and long run impact of interest rate (KLIBOR) on Islamic bank’s Nonperforming loan rate. The methodology applied is ‘Auto – Regressive Distributive Lag’ model which has taken care of a major limitation of the conventional cointegrating tests in that they suffer from pre-test biases. Based on the above rigorous methodology, we try to measure both long- and short-run relationships between the interest Rate (KLIBOR) and the non-performing loan by using other controlling variables (loan growth rate unemployment rate, & industrial production index). This study may be considered significantly different from previous studies since to the best of our knowledge, there is no literature available that directly examines the impact of KLIBOR on non-performing loans in Islamic banks. From the detailed theoretical and literature study it is found that most of the theories related to Nonperforming loan rate connected with interest rate are not applicable to Islamic banking. The empirical findings show that the interest rate (KLIBOR) makes impact only in the short run and shows the insignificant impact in the long run. It is also found that there is no effect of crisis in the short and long run on Non-performing loans in this model.

**Keywords:** Non performing loans, interest rate (KLIBOR), Islamic banks, ARDL Malaysia

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# **Does the conventional benchmark prop up non-performing loans in Islamic banks? A case study of Malaysia with ARDL Approach**

## **Introduction: The Issue Motivating the Study**

Banks in the modern economy are profit maximizing businesses. The simple explanation is that banks allow for the secure depositing of money for individuals and businesses. However, when banks receive a substantial amount of deposits, it becomes irrational to simply let the money sit there. As a result, banks then invest this money and have it earn interest for the bank and the depositor. From this, banks became central actors in the modern economic system. Using a very simple model, when banks collect deposits, they seek to make this money "work" for them through investing it by lending it out to others. Since it is unlikely that depositors will demand their money all back at once, the bank can leverage its deposit collection to back larger and larger risks. In other words, they will use their deposit money to leverage larger loans and investments, thus keeping only a fraction of their deposits actually on hand. The significance area for banks in modern financial systems is as mediators of risk. Banks are for-profit organizations that seek to use depositor's funds as backing for long term investment.

But when it talks about the Islamic banks, it is not only a profit making business but a process by which the rules of shariah is maintained and followed with the objective of socialresponsibility. The contractual relationship with the Islamic banks and the customers are different from conventional banking. The income is treated as profit instead of interest. Mean while the contractual relationship between the bank and customers change the source of bank's income nature also changes. The main similarities between conventional and Islamic banks are they both deals with the human nature and prevail in the same economy.

There are many situations in the both conventional and Islamic bank where the bank deals with the behavioural pattern of their customers. As it stated before the primary income of the conventional bank that is interest which earns by way of lending loan is directly related with the human beings. The case of the Islamic banks also the same other than the contractual relationship and the nature of income they receive. The Term 'Default' is common in both Entities. The formal and standardized Term of this phenomenon in the books of the bank is treated as Non performing loan.

The theme of "non-performing loans" (NPL) has attracted more attention in recent decades. Several studies examined bank failures and find that asset quality is an indicator of insolvency (Demirguc-Kunt, 1989; Barr and Siems, 1994). Banks still have a high level of Non performing before the bankruptcy. Therefore, the large amount of bad loans in the banking system generally results in a bank failure. The NPL are among the main causes of the problems of economic stagnation. Each Non performing loan in the financial sector increases the possibility to lead company to difficulty and unprofitability. Increase in NPLs rate is referred often as the failure of credit policy too. By viewing other side of the picture, it is also evident that financial crisis is also the effect of high NPLs rate in the banking sector. Financial crisis of late 2000s, which started from US and spread into whole world having trading relationships with US, is also labelled as cause of default in mortgages/loans. Increases in NPLs' rate are the main reason of reduction in earnings of banks.

Understanding the nature of bank loan losses has numerous implications. In this regard, there are two strands of literatures. The first strand of literatures considers bank specific variables such as the quality of management, profit margins, and policy choices, risk profile of banks, size and market power on problem loans. The second strand of literatures focus more on quantitative variables, which include economic growth, inflation, interest rate and exchange rate among other macroeconomic variables. The components in the first standard of the literatures (bank's specific variables) changes according to the nature of the banking activity (Islamic or conventional). The banks have full freedom to make decision about these factors. There is no control or command by the banks over the components on the second standard of literature which includes growth, inflation, interest rate and exchange rate among other macroeconomic variables.

One of the significant features of the Islamic bank which differentiate from other conventional banks is the interest rates which fall under as one of the component in the second standard literatures. The main issue and the motivation of this study lies on The nature Being a common factor (interest rate) in both conventional and Islamic banks and which does not have any control by both the conventional and Islamic bank, what impact interest rate causes on the rate of nonperforming loans on the Islamic banks in short and long run.

The role of the interest rate in the banks is recognized by many authors. The values of assets and liabilities of financial institutions are considered subject to fluctuations in interest rate. The

studied found the differential impact in interest rate changes between assets and liabilities which is referred to, in banking, as interest rate risk. Of all threats to bank competitiveness this risk dwarfs all others. Banks traditionally have dealt with interest rate risk by restructuring their loan portfolios. But in the case of Islamic banks, the above mentioned factors won't take place in the scenario. Since the Islamic banks does not deal with the interest rate mechanism except bench marking. The studies related with interest and non performing loan in the conventional banking system states that there is significant positive impact. But when it taken the consideration in the Islamic banking field it remains not answered the impact of interest rate on non performing loans in Islamic banks. There is no measurement needed in the Islamic bank to measure the risk related with the interest rate. But the Islamic banks have developed the profit and loss risk rate mechanism instead of that.

Lending rates/ interest rates are one of the primary economic determinant of non-performing loans/bad loans. There is an empirical evidence of positive correlation between the interest rate and non-performing loans (Nkusu 2011;Adebola, Yusoff, &Dahalan, 2011; Louzis, Vouldis and Metaxas, 2011; Berge and Boye, 2007). An increase in interest rate weakens loan payment capacity of the borrower there for non-performing loans and bad loans are positively correlated with the interest rates (Nkusu, 2011). As far as interest rate policy is concerned it plays very important role in NPLs growth rate in a country/economy, Hoque and Hossain (2008) examined this issue and according to them non-performing loans are highly correlated with the high interest rates which enhances the debt burden of the borrowers and causes loan defaults. When it talks about the islamic bank's effect on the interest rate on non performing loans, from the authors knowledge there is seldom studies has taken place which concentrating the interest rate on the issue. Also because of that there is no previous empirical findings found other than the issue related to conventional banks.

Most of these studies have not only concentrated on developed counties, but also oncommercial banks without any consideration for Islamic banks. However, Islamic banks bring anotherdimension into the fray. This is because, unlike conventional system, Islamic banks do not operate oninterest rate system. Instead, Islamic banks operate on profit and loss paradigm, which suggest thatNPLs in Islamic banks may transit signal of financial crises faster than conventional banks. To thebest of authors' knowledge there is no study on examining the direct impact of interest rate on NPLs in the Islamic banking system. Thus,macroeconomic determinants and micro determinants of NPLs in Islamic banks in Malaysia are examined in this study. The key objective of this study is to examine the effect of interest rate in

Nonperforming loan in Malaysia. Both long- and short-run relationships between these variables are measured by using ARDL approach. Malaysia is selected because of its pole position as a leading Islamic finance hub. The study has a lot of contributions. It adds to the extant literature by providing evidence on the causes of NPLs in a developing country like Malaysia and most importantly in an Islamic banking system. The outcome of this study may serve as basis for measuring and assessing credit risk in Islamic banks in Malaysia. Moreover, the study may serve as a prelude to other study on the determinants of NPLs in Islamic banking system of other countries.

From the Detailed theoretical and literature study it is found that Most of the theories related to Nonperforming loan rate connected with interest rate are not applicable to Islamic banking. Therefore, there is a possibility that religious belief might play an important role in the banking decisions of Muslim customers. The empirical finding from the policy perspective is that the interest rate makes impact only in the short run and shows the insignificant impact in the long run. It is also found that there is no effect of crisis in short and long run on non performing loans in this model. These findings also confirm the findings of the variance decomposition (VDC) test and it is found that the controlling variables are relatively endogenous than the interest rate when the shocks takes place in Nonperforming loans (NPL) in the first set of horizon which covers the first five year and the in the long run the set of horizon which covers the last five year, industrial production index (IPI) became the most exogenous variable which implies that the changes in the Non performing loan in the long run could explained more by the industrial production index than the interest rate .

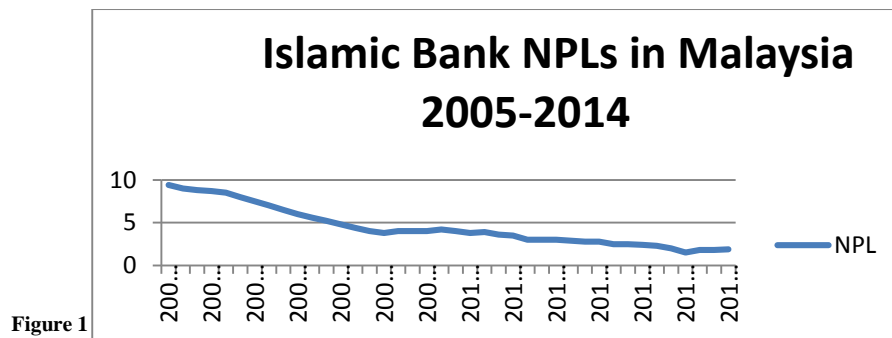
The structure of this paper designed as Section 2 provides a literature review. Section 3 describes data and theoretical foundations followed by methodology, empirical results and discussion in Section 4 and finally we conclude with Section 5 which includes proposed policy implications based on the empirical results.

Before Start with the review of the literatures regarding the study it is indeed to have the knowledge about the background and the significance of the issue which will help in easy appreciation of the findings and policy implications behind the studies.

## **Islamic banking NPLs in Malaysia**

The coverage and classification of Nonperforming loans and provisioning for the same differs across the globe. Countries set guidelines based on some peculiar characteristics, but usually aligned with the provisions of International Accounting Standards Board (IASB) with the sole objective of ensuring the banking system soundness. Most countries without domestic guideline on loan impairment normally follow the provisions of IASB. In Malaysia, Malaysian Accounting Standards Board (MASB), established under the Financial Reporting Act 1997 is responsible for setting out the minimum requirements on loan impairment. MASB issued Financial Reporting Standards (FRS) 139 –Financial Instruments: Recognition and Measurement. FRS 139 serves as a blanket standard for all banking institutions (commercial banks and investment banks) licensed under the Banking and Financial Institutions Act 1989 (BAFIA) and Islamic banks licensed under the Islamic Banking Act 1983 (IBA), (BNM Act, 2011).

Considering the trend of NPLs in Islamic banks of Malaysia, it is noted that it has been fluctuating over the years. From Fig. 1, we observed that NPLs fell from almost RM 3.5 billion in January, 2007 to around RM 2.9 billion in December 2007. This is a period characterised with low interest rate environment, access to credit providing support for households' spending, increased headline inflation rate (which increased at a slower pace of 2% in 2007) and economic growth of 6.3% (BNM Annual Report, 2007). Therefore, this is an indication that while interest rates positively move with NPLs, GDP negatively moves with NPLs. The volume of NPLs in Islamic banks further fell to almost RM 2.5 billion at the end of 2008. In the same period, Malaysia economy grew by 4.6% and headline inflation rate averaged 5.4% in 2008 (which is significantly higher than the country's long-term inflation average of 3.0%) lending credence to a negative impact of GDP and inflation on NPLs in Malaysia. Interest rates remained low and accommodative thus partly responsible for fall in the volume of NPLs in 2008 (BNM Annual Report 2008). At the end 2009, the economy contracted by 1.7%, while the NPLs jumped to almost RM 3.0 billion, suggesting a negative relationship between GDP and the volume of NPLs. Moreover, central banks aggressively eased monetary policy as interest rates were reduced to record lows (BNM Annual Report, 2009). Generally, it is observed that the volume of NPLs is negatively associated with economic growth and inflation rate, but positively associated with the rate of interest. There are several econometrics methods in which these relationships may be better tested.



### Theoretical underpinnings

The clarity in knowledge of the theoretical background of the issue will help to appreciate the strength and usefulness of the study. Since the study is based on the Non performing loan and the interest rate, it is indeed to differentiate the nature of theories based on the study. When it talks about the non performing loans the term is more in line with the behavioural pattern of the customers and in the case of interest rate there are many established theories behind it. But when it brings together these factors in to an issue it is found that there is no established theory which talks about the impact of interest rate on interest free institutions from the author's span of knowledge. So here I am trying to make a humble attempt to discuss the theories based on the conventional background and trying to relate this with Interest free background.

Default culture is not a new dimension in the area of investment rather in the present economic structure .it is an established culture. The redundancy of the unusual happening becomes so frequent that it seems the people prefer to be declared as defaulted. In developing and under developed countries, the reasons for being default have a multi dimensional aspect various researches have concluded various theories behind the Non performing loan.

When it talks about the theoretical underpinnings of non performance of loans, it is indeed to cover the all aspect from the perspectives of Customer, bank, and the System. The classification of these theories will help the readers to make sure the clear understanding on the issue.

From Bank's perspective- Theory of Hawthorne effect, Theory of Pollyanna effect, Theory of patronizing effect, , Theory of Petroski effect, Theory of inverted pyramid risk.

From the Borrowers perspective- Theory default culture effect

From the Environment perspective- Theory of Give and take the chance effect



### **The theory of Hawthorne effect**

The significant implication of this theory is reduced attention to borrowers. Researchers at Hawthorne electric company in the US in the 1920s wondered what effect changes in lighting; heating and similar variables would have on factory workers. To the researchers amazement, productivity increased throughout the study, during which time lighting was varied greatly from normal to dim to brilliant and back, the heat was turned up and down, etc. The puzzled researchers eventually concluded that the workers were responding positively because they were the subjects of interest, not because of changes in their Working conditions. Workers perceptions that someone is paying attention to them get better results than perceptions of inattention, of being ignored. Borrowers may also perform in this manner. So that it may lead to the Non performance of borrowed loan

### **The theory of Pollyanna Effect**

The main implication of this theory is Lenders lack of plans to deal with risk. Donor-funded credit programs are usually designed without a clear focus on risk. In micro finance promotion there seems to be no clear vision of risk or no industry-wide concern about means of addressing it, other than running a tight ship. The literature is largely concerned with outreach measured by number of borrowers and covering administrative costs the jury is still out of micro-enter performance which is currently supported by a tidal wave of donor funds that lifts all but the leakiest of ships. This theory is very much in line with the non performance of the loan from the bank's point of view.

### **The theory of Patronizing Effect**

The main implication of this theory in relation with Non performing loan is The lender's unwillingness to collect loans. Unwillingness may arise from a number of factors, but almost always requires soft funds that lenders can afford to lose. Unwillingness to collect may result from the realization that the credit program was poorly designed, destined to fail. It may also reflect a view that the beneficiaries are poor while the sponsors are not, and that a sense of fairness precludes any serious action against defaulters.

### **The theory of Inverted Pyramid Effect**

The main implication of theory regarding the non performance loan is Increasing loan size increases risk. In the 1980s the manager of a donor funded project to develop rural credit unions in Malawi were pleased to note a large increase in deposit mobilization in a small credit union in a remote location. Project funds were used to enable borrowers to obtain loans equal three times their deposit or share balances. But one day, the expansion ended, as did the credit

union. This may be easily explained with a numerical example: one farmer deposited 100 and borrowed 300. He kept 100 and gave a relative or friend 2 which that person deposited in the credit union. That person then borrowed 600. Kept 200 and gave 400 to another relative or friend. After everyone in the village had participated and the loot was shared, the exercise ended. This is also seen clearly in loan use progressions by members of most of the Banks in different countries.

Loan may also be Non-performing if it is used in a different way than that for which it has been taken. This is the user's point of view.

### **Default Culture Effect**

The theory states that the possibility is that lenders are simply not familiar with successful examples of dealing with bad and doubtful debts. This is likely in transaction economics in North and Central Asia where commercial banking is still something of a novelty compared to banking in service to economic planning it also occurs as in Bangladesh and Nepal, where state domination of the banking system has been accompanied by a high tolerance of non-repayment associated with politicization of financial markets. Legal recourse in these situations is remote, costly, and uncertain. This lack of credible models can be called High Default Culture Effect

Loan may also be Non performing if the system is prevail in a different state than a normal state which it has been taken. This is the system's point of view.

### **Theory of Give and Take the Chance Effect**

Loan sanctioned by corruption sometimes loan sanctioning authority sanctions loans In countries like developing countries, for satisfying their self interestedbehaviour. Thus, they engage themselves with the clients and corrupt the total system by giving some benefits for taking something in return. This may be called as Give and Take the Chance Effect. This is the result of too much politicization and power-relatedness in the institutional system.

It is indeed to discuss about the underpinning theories about the controlled variables (Interest rate (INT) industrial production index(IPI) Un employment(UEMP) Growth rate in total loan approval (INC)) to have the clear idea about the study

Unemployment is the other factor which has caused a huge volume of non-performing loans especially in the consumer financing. If a person doesn't have any source of income and even

don't have money to buy his food how we can expect him to pay his loan instalments in time that's why there is a huge volume of non-performing loans in the consumer sector of Malaysia. If this unemployment problem is resolved people are given jobs and they have any source of earning it can also positively affect the demand of the products because increased unemployment in the economy also negatively affects the demand of the products of firms which ultimately affects the production/sales of the firms, this ultimately leads to decline in revenues of the firms and a fragile debt conditions.

The relationship between the non performing loans and the growth rate of granting of loans has been studied in the literature relating the phases of the business cycle with banking stability. The economic expansion phase is characterized by a relatively small number of bad loans, as consumers and companies have sufficient income and revenue to cover their debts in predetermined deadlines. If the expansion phase continues to exist, then the credit is granted without considering the quality of the receivables. However, in the recession phase, an increase in bad debts it has adverse consequence. In general, theoretical models of the business cycle with a financial explicit role offer a good basis for modelling NPL because they emphasize the cyclical nature of counter credit risk and business failures (Williamson, 1987).

Industrial production Index (IPI) which is the proxy for the GDP in this study May have the impact of the Non performing loans rate. According to Okun's law, there is a positive significant relation between the GDP and employment. , there is a corresponding two percent increase in employment for every established one percent increase in GDP. The reasoning behind this law is quite simple. It states that GDP levels are driven by the principles of demand and supply, and as such, an increase in demand leads to an increase in GDP. Such an increase in demand must be accompanied by a corresponding increase in productivity and employment to keep up with the demand. GDP and unemployment rates are linked in the sense that both are macroeconomic factors that are used to gauge the state of an economy. A rise in the GDP is significant in the study of macroeconomic trends in a nation. This is also true of a rise or decrease in unemployment levels. GDP and unemployment rates usually go together because a decrease in the GDP is reflected in a decrease in the rate of employment. From the above mentioned theory it can be conclude that there is a chance to have a significant by the GDP (proxy IPI) on the non performing loan rate of the respective country.

The strong knowledge about the issue is lies in the hands of previous literatures created on concerned issue. The following section discuss about the previous literatures on Non performing loans and other variables taken in to the consideration for the study.

## **Literature Review**

Non-performing loans are dangerous not only for the economy of one country but also for the whole world as we have seen the financial crisis created by these loans in East Asian countries, America and Sub-Saharan Africa, so this is the need of the era to identify the factors responsible for non-performing loans; as researchers believe that once we identify these factors then we can make policies to prevent any future happenings of these loans (Adebola, Wan Yusoff, & Dahalan, 2011)

Lots of researches have been conducted on the widespread issues of Islamic banking activities. NPLs also have a lot of literature due to its importance for the survival of banks. Before starting with the determinants of the Non performing loans it is indeed to analyse the literatures which talks exactly on the nature of the NPL. There are many literatures found from the different studies which talks about the nature of the NPL. As it is stated before in recent years, the literature on non-performing loans has occupied the interest of several authors particularly the attention in understanding of the variables liable to the financial vulnerability (Khemraj and Pasha, 2009).

There are many studies has already taken place regarding the non performing loan in conventional banks and it is found that different combination of the variable which has significant positive and negative impact on the non performing loans. When it talks about the studies which is carried out on the Islamic studies on the same issue, to the best of our knowledge there is no literature available that directly examines the impact of interest rate on non performing loans in Islamic banking. The most of the studies talks about the profitability (Abdel-hameed m. Bashir 2003), (M. Kabir Hassan, 2007), (shaistawasiuzzaman and Hanimasayu 2010) and deposits (M Abduh - 2011 ), (I Auwalin - 2008). There are couple of studies taken place which talks about the non performing loans in the Islamic banks, (Solarin Sakiru Adebola, Prof. Wan Sulaiman b. Wan Yusoff, Dr. Jauhari Dahalan 2011) but the study had no concentration in one of the significant variable which differentiate the concept of Islamic and conventional banks.

While talking about the determinants of NPLs specifically, different categories are involved. Among the variables, the only different take place in the Islamic banks from conventional banking is the interest rate. There are many studies carried out in different time which measure the impact of interest rate on non performing loans in the conventional banks. It is indeed to talk on it since there is no established literature on the Islamic banks based on non performing loan rate. There is an empirical evidence of positive correlation between the interest rate and non-performing loans (Nkusu 2011; Adebola, Yusoff, & Dahalan, 2011; Louzis, Vouldis and Metaxas, 2011; Berge and Boye, 2007). An increase in interest rate weakens loan payment capacity of the borrower there for non-performing loans and bad loans are positively correlated with the interest rates (Nkusu, 2011). As far as interest rate policy is concerned it plays very important role in NPLs growth rate in a country/economy, Hoque and Hossain (2008) examined this issue and according to them non-performing loans are highly correlated with the high interest rates which enhances the debt burden of the borrowers and causes loan defaults. Espinoza and Prasad (2010) examined the macroeconomic determinants of non-performing loans in the GCC banking system according to them high interest rates increases loan defaults but they did not find statistically significant relationship. Bloem and Gorter (2001) studied causes and treatment of NPLs, according to them frequent changes in the interest rate policy causes an increase in the bad loans. Asari, et al. (2011) also found significant relationship between loan defaults and interest rates they also found that an increase in loan defaults also causes asset corrosion of banks and subsequently capital erosion. According to DashandKabra (2010) the banks with aggressive lending policies charging high interest rates from the borrowers incur greater non-performing loans. Collins and Wanjau (2011) also found interest rate as a primary factor boosting non-performing loans.

As it is mentioned in the introduction part, the other variables used in this study have the same characteristics with conventional banks while it compare with the Islamic banks. So the findings mentioned in literatures of conventional banks can also affect the Islamic banks especially the macro variable since it prevails in the same economy and the effect is same with each other. The academic literature provides evidence to suggest a strong relationship between the NPL and many macroeconomic variables. An economy in growth is favourable to an increase in revenues and a decrease in financial distress. As a result, real GDP growth and employment are negatively associated with the NPL. Conversely, unemployment is positively related to the NPL. Several empirical studies have found a negative association between NPL and real GDP growth (Salas and Saurina 2002; Fofack, 2005; Jimenez and Saurina, 2006;

Khemraj and Pasha, 2009; Dash and Kabra, 2010). The justification provided in the empirical literature of this association is that higher positive level of real GDP growth habitually entails a higher level of income. This improves the capacity of the borrower to pay its debts and contributes to reduce bad debts. When there is a downturn in the economy (slowed or negative growth of GDP) the level of bad debts will increase.

Adebola et al. (2011), explore the factors that explain the NPL of Islamic banks in Malaysia for the period from 2007 to 2009. They employ the ARDL (Auto-Regressive Distributed Lag) to examine the effects of certain macroeconomic variables including the industrial production index, the interest rate and the index of producer prices. The results indicate long-term relationships between variables and note that the interest rate has a significant positive long-term impact on bad loans.

In addition to macroeconomic variables, there are several empirical studies suggest that factors specific to the bank (such as size, efficiency, credit terms) market power and the risk profile are important determinants of NPL, because they can cause risky loans. The nature of the micro variable prevails in the Islamic banks is not as same as conventional banks. the micro variable which taken for the purpose of the study is growth in loan rate and nature of the variable is same in both baking system

The literature indicates that rapid credit growth is often related with impaired loans. Bercoff et al. (2002) examined the Argentine banking system and demonstrated that credit growth have an impact on the impaired loans. Indeed, excessive loans offered by banks are habitually considered as a main determinant of impaired loans (Keeton and Morris, 1987; Sinkey and Greenwalt, 1991; Keeton, 1999; Salas and Saurina, 2002; Jimenez and Saurina, 2006). As for Jimenez and Saurina (2006), they attributed the increase of loans to the herd behavior and agency problems that could encourage managers of banks to lend excessively during periods of crisis. Several studies have confirmed the presence of this positive relationship such as the studies of Khemraj and Pasha (2009) and Dash and Kabra (2010). Sinkey and Greenwalt (1991) found a significant positive relationship between the rate of loan losses and internal factors such as excessive lending, high interest rates. Similarly, Pesola (2007) considers that loan losses are a key factor affecting the proper functioning of credit institutions

There are many other micro variables which has the same characteristic on both Islamic and conventional system. One of them is the efficiency. By analyzing the context of the Czech banking sector for the period 1994 2005, Podpiera and Weill (2008) concluded that

inefficiency is positively associated with future increases in non-performing loans. The authors argue that regulators should focus on managerial performance in order to improve the stability of the financial system. The same result was found by Louzis et al., (2010) in the case of Greek banks. Under the assumption of mismanagement advanced by Berger and DeYoung (1997), managers do not have the skills to assess and control risks when loans are granted to new customers.

Based on the above theoretical standpoints, this study also attempt to provide theoretical answersto the research questions of our study and would like to progress our study with empiricalanalysis in order to provide empirical answers to the same research questions. This theoreticaland empirical combination is significant since practical situations may deviate from thetheoretical relations depending on timing and conditions of the economies.

### **The Model, Data andMethodology used**

A simple model is used to examine the variations in Non Performing loan (NPL) in IslamicBanks of Malaysia. There are lots of factors responsible for this issue regardless the Nature of banking system (conventional or Islamic). Some of them belong to micro (firm) measures and some are from macroeconomic measures. However this study is based on blend of these factors.

The functional form of the model is as

$$NPL=f(INT, UEMP, IPI, INC)$$

Where

NPL= Total Nonperforming loans of Islamic banks in Malaysia (private and investments)

INT= Average lending rate (KLIBOR)

GDP= Gross Domestic Product, proxy (industrial production)

INC= Growth Rate of Total loan provided in Islamic banks in Malaysia.

CRISIS= Dummy Variable for the Crisis period (2007Q3 to 2009Q2)

In order to test the impact of interest rate effect on Non-performing loans in Islamic banks, the following relationship is examined:

$$LNPL_t = \alpha_0 + \alpha_1 LINT_t + \alpha_2 LEUMP_t + \alpha_3 LINC_t + \alpha_4 LIPI_t + \alpha_5 CRISIS_t + e_t(1)$$

### **DATA**

The study employs Quarterly time series data for the period Quarter1 2005 to Quarter4 2014, due to the data constraint. The period coincides with the occurrence of global financial crisis episode. The dependent variable average of NPLs in Islamic banks and Islamic Banking Scheme of Commercial banks in Malaysia- is measured by the ratio of 3-month net non-performing financing/ Impaired financing to 3 month net total financing of Islamic banks. Due to non-availability of quarterly data on GDP, the study utilises industrial production index to track rate of economic activity. While average lending rate (LIBOR) represents interest rate. Lending rate is used because the computation of financing rate in Islamic banks started in 2005. UEMP represents the unemployment rate prevailed in the economy during that period. The (INC) represents the growth in approval of total loans by Islamic banks in Malaysia during the period. The total value is the sum of the loans approved to private and investment sector. All the data are collected from International Financial Statistics (IFS) of the International Monetary Fund, with the exception of NPL and INC (growth in loan approval), which is available at Bank Negara Malaysia (BNM) monthly statistical bulletin. In order to compute the variables' growth rates, we transform the variables into natural logarithm.

## **Methodology**

As far as methodology is concerned, we employ auto regressive distributive lag (ARDL) approach from Pesaran and Pesaran (1997) and Pesaran et al. (2001). This method can be applied to the variables irrespective of the order of their integration, that is ARDL approach can take care of the series that are purely  $I(0)$ , purely  $I(1)$  or mixed. Since the variables used in the study are mixed of the Non stationary and stationary variables we decided to use this approach. Conventional methods employed in the literature mainly require the variables to be integrated of order one. The ARDL model has some advantages over other cointegration approaches.

Firstly, this technique is comparatively more robust in small or finite samples consisting of 30 to 80 observations (Pattichis, 1999; Mah, 2000). Secondly, it can be utilized irrespective of whether regressors are of  $I(0)$  or  $I(1)$  or mutually integrated, There is still prerequisite that none of the explanatory variables is of  $I(2)$  or higher order, i.e. the ARDL procedure will, however, be inefficient in the existence of  $I(2)$  or higher order series. Thirdly, the ARDL Model applies general-to-specific modelling framework by taking sufficient number of lags to capture the data generating process. It estimates  $(p + 1)k$  number of regressions in order to obtain an



optimal lag length for each variable, where  $p$  is the maximum lag to be used, and  $k$  is the number of variables in the equation. The model is selected on the basis of different criteria like SBC, AIC, RBC and HQC.

Furthermore, traditional cointegration methods may also experience the problems of endogeneity, whereas the ARDL method can distinguish between dependent and explanatory variables and eradicate the problems that may arise due to the presence of autocorrelation and endogeneity. ARDL cointegration estimates Short run and long run relationship simultaneously and provide unbiased and efficient estimates. The appropriateness of utilizing ARDL model is that the ARDL model is based on a single equation framework. The ARDL model takes sufficient numbers of lags and direct the data generating process in a general to specific modelling framework (Harvey, 1981). Unlike further multivariate cointegration techniques such as Johansen and Juselius (1988), ARDL model permits the cointegration relationship to be estimated by OLS once the lag order of the model is identified.

Error Correction Model (ECM) can also be drawn from by ARDL approach (Sezgin and Yildirim, 2003). This ECM allows drawing outcome for long run estimates while other traditional cointegration techniques do not provide such types of inferences. "ECM contains Short run adjustments and Long run equilibrium Without losing Long run information" (Pesaran and Shin, 1999). The above advantages of the ARDL technique over other standard cointegration techniques justify the application of ARDL approach in the present study to analyze the impact of interest rate (INT) on non performing loan rate (NPL) by controlling the variables industrial production index (LIPI) which is proxy for GDP, unemployment rate (UEMP) and growth in loan (INC).

The Next step in the analysis is to "test the null hypothesis of no cointegration ( $H_0: \delta_1 \delta_2 \delta_3 \delta_4 \delta_5 = 0$ ) against the alternative hypothesis that there exists cointegration ( $H_1: \delta_1 \delta_2 \delta_3 \delta_4 \delta_5 \neq 0$ ) between all variables by using F-statistic. The F-test, which has a non-standard distribution, is considered on the lagged levels of the variables in determining whether a long-run relationship exists among the variables. In this regards, two bounds of critical values are generated. The lower bound critical values serve as benchmark for I(0) variables, while the upper bound critical values serve as benchmark for I(1) variables. According to the bound test, cointegration exists if the computed Statistic exceeds the upper critical value. If computed F-statistic falls within the two bounds of critical values, the variables must composed of level and first difference integrated series for possibility of cointegration. Finally, if the F-statistic is below the lower critical value, it implies no cointegration.

In the next step, short run and long run linkage is examined by using the error correction model (ECM). The ARDL approach to co integration involves estimating the unrestricted error correction model version of the ARDL model for Islamic non performing loan rate and its determinants: The error correction equation is used to find the adjustment speed to the equilibrium in the third stage.

The error correction version of the ARDL (4, 4, 4, 4, 4, 4,)model is as follows:

$$\begin{aligned}\Delta \text{INPL}_t = & \alpha + \sum_{i=1}^4 \alpha \Delta \text{INPL}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INT}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{UEMP}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INC}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{IPI}_{t-i} \\ & + \sum_{i=1}^4 \alpha \Delta \text{CRISIS}_{t-i} + \delta_1 \text{INPL}_{t-1} + \delta_2 \text{INT}_{t-1} + \delta_3 \text{UEMP}_{t-1} + \delta_4 \text{INC}_{t-1} + \delta_5 \text{IPI}_{t-1} + \delta_6 \text{CRISIS}_{t-1} \\ & + e_t\end{aligned}$$

$$\begin{aligned}\Delta \text{INT}_t = & \alpha + \sum_{i=1}^4 \alpha \Delta \text{INT}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INPL}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{UEMP}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INC}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{IPI}_{t-i} \\ & + \sum_{i=1}^4 \alpha \Delta \text{CRISIS}_{t-i} + \delta_1 \text{INT}_{t-1} + \delta_2 \text{INPL}_{t-1} + \delta_3 \text{UEMP}_{t-1} + \delta_4 \text{INC}_{t-1} + \delta_5 \text{IPI}_{t-1} + \delta_6 \text{CRISIS}_{t-1} \\ & + e_t\end{aligned}$$

$$\begin{aligned}\Delta \text{UEMP}_t = & \alpha + \sum_{i=1}^4 \alpha \Delta \text{UEMP}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INPL}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INT}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INC}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{IPI}_{t-i} \\ & + \sum_{i=1}^4 \alpha \Delta \text{CRISIS}_{t-i} + \delta_1 \text{UEMP}_{t-1} + \delta_2 \text{INPL}_{t-1} + \delta_3 \text{INT}_{t-1} + \delta_4 \text{INC}_{t-1} + \delta_5 \text{IPI}_{t-1} + \delta_6 \text{CRISIS}_{t-1} \\ & + e_t\end{aligned}$$

$$\begin{aligned}\Delta \text{INC}_t = & \alpha + \sum_{i=1}^4 \alpha \Delta \text{INC}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INPL}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{INT}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{UEMP}_{t-i} + \sum_{i=1}^4 \alpha \Delta \text{IPI}_{t-i} \\ & + \sum_{i=1}^4 \alpha \Delta \text{CRISIS}_{t-i} + \delta_1 \text{INC}_{t-1} + \delta_2 \text{INPL}_{t-1} + \delta_3 \text{INT}_{t-1} + \delta_4 \text{UEMP}_{t-1} + \delta_5 \text{IPI}_{t-1} + \delta_6 \text{CRISIS}_{t-1} \\ & + e_t\end{aligned}$$

$$\begin{aligned}\Delta IPI_t = & \alpha + \sum_{i=1}^4 \alpha \Delta IPI_{t-i} + \sum_{i=1}^4 \alpha \Delta LNPL_{t-i} + \sum_{i=1}^4 \alpha \Delta IINT_{t-i} + \sum_{i=1}^4 \alpha \Delta IUEMP_{t-i} + \sum_{i=1}^4 \alpha \Delta IINC_{t-i} \\ & + \sum_{i=1}^4 \alpha \Delta CRISIS_{t-i} + \delta_1 IPI_{t-1} + \delta_2 LNPL_{t-1} + \delta_3 IINT_{t-1} + \delta_4 IUEMP_{t-1} + \delta_5 IINC_{t-1} + \delta_6 CRISIS_{t-1} \\ & + e_t\end{aligned}$$

$$\begin{aligned}\Delta CRISIS_t = & \alpha + \sum_{i=1}^4 \alpha \Delta CRISIS_{t-i} + \sum_{i=1}^4 \alpha \Delta LNPL_{t-i} + \sum_{i=1}^4 \alpha \Delta IINT_{t-i} + \sum_{i=1}^4 \alpha \Delta IUEMP_{t-i} + \sum_{i=1}^4 \alpha \Delta IINC_{t-i} \\ & + \sum_{i=1}^4 \alpha \Delta IPI_{t-i} + \delta_1 CRISIS_{t-1} + \delta_2 LNPL_{t-1} + \delta_3 IINT_{t-1} + \delta_4 IUEMP_{t-1} + \delta_5 IINC_{t-1} \\ & + \delta_6 IPI_{t-1} + e_t\end{aligned}$$

The hypothesis that we will be testing is the null of non-existence of the long-run relationship, defined by

$$H_0: \delta_1 \delta_2 \delta_3 \delta_4 \delta_5 \delta_6 \delta_7 = 0 \text{ against } H_1: \delta_1 \delta_2 \delta_3 \delta_4 \delta_5 \delta_6 \delta_7 \neq 0$$

As discussed earlier, we use the following variables for our lead-lag analysis. The variable taken were Non performing loan Rate (NPL), Interest Rate (INT), Un employment rate (UEMP) and loan growth rate (INC) and industrial production index (IPI). All the variables are transformed into logarithms to achieve stationarity in variance. All the level forms of the variables were transformed into the logarithm scale.

We begin our empirical testing by descriptive statistics and Diagnostics tests of the data set which is treated as base of the all other empirical tests. Following, we start with determining the stationarity of the variables used. In order to proceed with the testing of cointegration later, ideally, our variables should be I(1), in that in their original level form, they are non-stationary and in their first differenced form, they are stationary. The differenced form for each variable used is created by taking the difference of their log forms. For example,  $DLNPL = LNPL - LNPL_{t-1}$ .

## Empirical Results and Discussions

Before proceeding with the ARDL framework, we examined the unit roots of the variables. Even though ARDL approach does not require tests of unit roots but it can give indication whether or not ARDL modelling is required. To check the unit roots of the variables, we performed unit root tests of each variable (Table 1). We used the Augmented Dickey Fuller

(ADF) tests (1979), Philip-Perron Test and Kwiatkowski–Phillips–Schmidt–Shin KPSS Test. We found our variables to be mixture of  $I(0)$  and  $I(1)$ , and the results shown different in each test. Therefore, we decided to proceed with ARDL modelling.

**TABLE: 1 Augmented Dicky Fuller (ADF) Test.**

Variable	Test Statistic	Critical Value	Implication
Variables in Level Form			
LNPL	-1.5643	-3.5468	Non-Stationary variable
LINT	-1.6355	-3.5468	Non-Stationary variable
LUEMP	-2.7688	-3.5468	Non-Stationary variable
LIPI	-1.9028	-3.5468	Non-Stationary variable
LINC	-3.0621	-3.5468	Non-Stationary variable
Variables in Differenced Form			
DNPL	-3.5368	-2.9528	Stationary variable
DINT	-3.4222	-2.9528	Stationary variable
DUEMP	-3.3125	-2.9528	Stationary variable
DIPI	-4.4857	-2.9528	Stationary variable
DINC	-4.6346	-2.9528	Stationary variable

**TABLE 2: Philip-Perron(PP) Test**

Variable	Test Statistic	Critical Value	Implication
Variables in Level Form			
LNPL	-2.0667	-3.5279	Non-Stationary variable
LINT	-.49085	-3.5279	Non-Stationary variable
LUEMP	-3.2508	-3.5279	Non-Stationary variable
LIPI	-2.0898	-3.5279	Non-Stationary variable
LINC	-4.8174	-3.5279	Stationary variable
Variables in Differenced Form			
DNPL	-3.8211	-2.9400	Stationary variable
DINT	-6.3620	-2.9400	Stationary variable
DUEMP	-4.6091	-2.9400	Stationary variable
DIPI	-6.2426	-2.9400	Stationary variable
DINC	-11.4428	-2.9400	Stationary variable

**TABLE 3: Kwiatkowski–Phillips–Schmidt–Shin(KPSS) test**

Variable	Test Statistic	Critical Value	Implication
Variables in Level Form			
LNPL	.10612	.18528	Stationary variable
LINT	.14665	.18528	Stationary variable
LUEMP	.15750	.18528	Stationary variable
LIPI	.12782	.18528	Stationary variable
LINC	.10192	.18528	Stationary variable
Variables in Differenced Form			
DNPL	.13884	.37674	Stationary variable
DINT	.35046	.37674	Stationary variable

DUEMP	.41901	.37674	Non-Stationary variable
DIPI	.19043	.37674	Stationary variable
DINC	.27108	.37674	Stationary variable

Before proceeding with the test of cointegration, we try to determine the order of the vectorauto regression (VAR), Even though it is not necessary to find out the VAR order for the ARDL approach since the process itself find individual lag order to each variable. As per the table below, resultsshow that AIC recommends order of four whereas SBC favours onelag. It will be more efficient to select the result according to the nature of the data set which we used in this study. The SBC is more concerned on over-parameter. It tends to choose lower order of lags.

**TABLE4: VAR order Selection**

	Choice Criteria	
	AIC	SBC
Optimal order	4	1

Given this apparent conflict between recommendation of AIC and SBC, we address this in the following manner. First, we checked for serial correlation for each variable. Serial correlation test suggested that there is no autocorrelation in any variable and we decided to move on with VAR order 1.

**TABLE 5: Bound Test for Cointegration (F Test)**

Variables	F statistics	Critical Value Lower	Critical Value upper
DNPL	9.0097	3.189	4.329
DINT	.91943	3.189	4.329
DUEMP	3.6243	3.189	4.329
DIPI	.90513	3.189	4.329
DINC	4.0734	3.189	4.329

Table: F-Statistics for Testing the Existence of Long-Run Relationship

**Table5** shows the calculated F-statistics (9.0097) which is higher than the upper bound critical value 4.329 at the 5% significance level. This implies that the null hypothesis of no cointegrating long-run relationship can be rejected. The economic implication of this result is the variables Non-performing loans (NPL), (interest rate (INT), unemployment (DUEMP), industrial production index (DIPI), growth rate of total loan (DINC) are moving together in a particular direction in the long run. These results reveal that a long-run relationship exists between the focus and controlling variables and Non-performing loan credit rates in Malaysia.

This by itself is a significant finding in view of the fact that the long run relationship between the variables is demonstrated here avoiding the pre-test biases involved in the unit root tests and cointegration tests required in the standard cointegration procedure. The evidence of long run relationship rules out the possibility of any spurious relationship existing between the variables. In other words, there is a theoretical relationship existing between the variables.

As stated earlier, cointegration tells us that there is a long run relationship between the variables. However, there could be a short-run deviation from the long-run equilibrium. Cointegration does not unfold the process of short-run adjustment to bring about the long-run equilibrium. For understanding that adjustment process we need to go to the error-correction model.

**TABLE 6; Results of Error Correction Representation for the selected ARDL Model**

Variables	Coefficient	Standard Error	T-statistics	P value
ECM (-1) DNPL	-.29241	.072679	-4.0232	[.000]*
ECM (-1) DINT	-.36552	.11804	-3.0966	[.004]*
ECM (-1) DUEMP	-.15729	.092752	-1.6958	[.201]
ECM (-1) DIPI	-.33644	.18685	-1.8005	[.142]
ECM (-1) DINC	-.18559	.12351	-1.5026	[.172]

Note: \* denotes significant at 5 percent level

The error correction model in the ARDL approach carries out not only the function of causality but also it confirms the cointegration function which differentiate the ARDL technique from other techniques. The 't' ratio or the 'p' value of the error-correction coefficient indicates whether the deviation from equilibrium (represented by the error-correction term) has a significant feedback effect or not on the dependent variable (i.e. NPL). In other words, whether the dependent variable endogenous or exogenous. The error-correction coefficient being significant confirms our earlier findings of a significant long-run cointegrating relationship between the variables. Moreover, the size of the coefficient of the error-correction term indicates the speed of short-run adjustment of the dependent variable to bring about the long-run equilibrium. The size of the coefficient of the error-correction term is also indicative of the intensity of the arbitrage activity to bring about the long-run equilibrium.

ECM's representation for the ARDL model is selected using the Schwarz Bayesian Criterion. The reason why we choosing this criterion are 'SBC' more concerned on over-parameter. It

tends to choose lower order of lags. Mean while AIC focus on predicting best of the order of lags. It focuses on large value of likelihood and less concerned on over-parameter. It tends to choose higher order of lags. Since the issue of the study is based on the Islamic banks and the span of the available data is less. According to the implication associated with this technique, I believe that the SBC criteria will be more effective in this situation.

The results shown more than one variable which is endogenous in the model (NPL {Ect}-4.0232[.000], INT {Ect}-3.0966[.004]). The rest of the variables (Unemployment {Ect}-1.6958[.201], industrial production index {Ect}-1.8005[.142], increase in the total loan approval {Ect}-1.5026[.172]) shown as independent. The results of the independent variables were not contradicting with the previous literatures according to the nature of the each variable except interest rate. From the theoretical point of view it has already proven that the Non performing loan is depended on other variables which are taken in to the consideration in this study and it is also empirically proven in other studies which were carried out on the conventional banks. When it considers the result of the interest rate, the implication of the results does not make sense in the reality and there is no theoretical and empirical background to justify the results. The nature of the interest rate is not depended on other variables which are taken in to the consideration in this study. Especially in the area of the banking and financing the interest is independent in nature which implies that the interest rate can't take in to the consideration as dependent variable in this study. One of the micro variable (INC total loan provided) which shown the exoginity in the model has no contradiction in the practical sense. Because the total amount of the loan approval of the bank is fully discretion of the bank management and none of other variables stated in the model has effect on it. The other variable unemployment (UEMP) makes the direct impact on the non performance of loans same time it has not found in any previous literatures or in theories stating that the non performing loans are making impact on the unemployment. It may have the effect in the micro level which is in the institutional level but it is may not affect the unemployment in general (macro) level. From the discussion on the unemployment it can be assume that the result shown in the error correction model regarding the variable unemployment is not contradicting the concepts in the practical world. When it comes to the variable industrial production index (IPI),it could be treat in the same way of other variables. In the reality, Industrial production index can make a negative or positiveeffect on non performing loans in the banks. Meanwhile there might not have any chance have the impact of non-performing loans in the total industrial production index since the non-performing loans is micro variable by the nature and it may not have the ability to

make the affect on the macro variables like industrial production. From the discussion it can be assume that the error correction result regarding the variable IPI which is the proxy of the GDP is accordance with the presumptions and the previous literatures.

By considering the p value and the higher t statistics in the short run results, theoretical background, previous literatures, and keeping the objective of this study in mind we choose the NPL among the set of endogenous variables. The errorcorrection statistics and p value shows the results which the variables are co integrated and it shows the causal relationship between variables .coefficient estimated at -.29241 (0.072679) is significant, has the correct signand implies a moderate speed of adjustment to equilibrium after a shock. Approximately 21.1% of disequilibria from the previous quarter's shock adjust to the long run equilibrium in the current quarter. Finally, the 't' or 'p' value of the coefficients of the  $\Delta$  (i.e., differenced) variables indicate whether the effects ofthese variables on the dependent variable (i.e., NPL) are significant or not in the short-run.

After considering the NPL (Non-performing loan) as the dependent variable, as mentioned in the objectives of the paper, it is indeed to spot the impact of the interest rate on Non-performing loans in short run and in long run. The following empirical results show the nature of the impact of interest rate in short and long run on Non-performing loan.

**TABLE 7: ResultsofEstimatedLong-RunCoefficientsusingthe ARDL Approach**

ARDL (1, 1, 1, 1,and 0) selected Based on Schwarz Bayesian Criterion

Variables	Coefficient	Standard Error	T-statistics	P value
LINT	.43282	.22980	1.8835	[.069]
LUEMP	-1.0413	.53337	-1.9523	[.060]
LIPI	1.5037	.55562	2.7063	[.011]
LINC	.067244	.39237	.17138	[.865]
INPT	-9.4134	6.2853	-1.4977	[.145]
CRISIS	-.0094970	.049951	-.19013	[.850]

From the table which explains the long run impact of the dependent variables on the Non performing loans, It is noticed the interest rate (INT) which is spotlight variable in this study has not exactly significant but it is very close to the statistical value. This is the same case regarding the variable unemployment (UEMP) this is contradicting with the Findings of Nkusu (2011),Vogiazas&Nikolaidou (2011), Bofondi and Ropele (2011). The statistical findings go against the previous literature (Nkusu 2011; Adebola, Yusoff, &Dahalan, 2011; Louzis, Vouldis and Metaxas, 2011; Berge and Boye, 2007),which states that the interest rate has the



positive impact on conventional banks in the short and long run. From this empirical finding on the literature it can be seen that there is no significant impact on the non performing loan by the interest rate. It might be because of the structure of the banking activities which always try to avoid the elements of interest based activity. Meanwhile it is still not answered that even though the Islamic banks use the interest rate as the benchmark, how it became there is no impact by the interest rate on Islamic bank in the long run.

The estimated long run coefficients of the long run relationship above show that LIPI (Industrial production index) which is proxy of the GDP has statistically most positive significant effect on the non performing loan rate among the studied variable which contradicts the empirical findings of growth (Salas and Saurina 2002; Fofack, 2005; Jimenez and Saurina, 2006; Khemraj and Pasha, 2009; Dash and Kabra, 2010). According to the literature it is found that there is a negative significant impact between GDP and non performing loan rate in the long run. From the empirical result it can be concluded that in Islamic banks in Malaysia there is a positive impact between GDP and NPL.

Rest of the variable Growth rate in loan (INC) is far away from the significant level and also has the negative coefficient which confirms the negative relation with the Non performing loan. Theoretically the sign of the coefficient does not contradict with empirical finding. But it is found that the increasing growth rate of loan makes insignificant impact on non performing loan in Islamic banks which contradicts the literatures of Keeton and Morris, 1987; Sinkey and Greenwalt, 1991; Keeton, 1999; Salas and Saurina, 2002; Jimenez and Saurina, 2006. It might be because of the less market share of the financing participation by the Islamic banks in the market when it compares with the conventional banks. Since the study is covered the period of financial crisis 2007-08, the result shows that there is no significant impact made by the crisis period on the non performing loan rate of the Islamic banks in Malaysia. It is clearly from the T statistic of the dummy variable CRISIS which is far away from the significant level and it shows somewhat negative coefficients as well. It is noted that one of the main reasons for financial crisis was due to the Non performing loan in the conventional sector and it is found that there is no significant impact made by the crisis in Islamic banks on the issue of study. It can be concluded that the Islamic banks have not that effected comparing with conventional banks in terms of nonperforming loan rate in the Crisis period. It can be assumed that it is because of the structural or internal efficiency of the Islamic banks on concerned issue.

**TABLE 8: Results of Estimated Short-Run Coefficients using the ARDL Approach**

ARDL (1, 1, 1, 1, and 0) selected Based on Schwarz Bayesian Criterion

Variables	Coefficient	Standard Error	T-statistics	P value
dLINT	.12656	.062629	2.0207	[.052]
dLUEMP	-.020275	.23290	-.08706	[.931]
dLIPI	.086408	.12349	.69972	[.489]
dLINC	.019663	.11357	.17313	[.864]
dCRISIS	.002777	.14296	-.19425	[.847]
ecm(-1)	-.29241	.072679	-4.0232	[.000]*

Note: \* denotes significant at 5 percent level

From the table which explains the short run impact of the dependent variables on the Non performing loans, It is found that only one variable which is the spotlight variable of this study interest rate (INT) has the statistically significant in the model in short run. It is also found that the interest rate has not statistically significant in the long run. From this analysis, it can be concluded that the short term fluctuation of the interest rate in the market affect the NPL rate but on later the significance disappears. This is also contradicting with previous literatures which the study conducted on the conventional banks. From this it can be concluded that the Islamic banks in Malaysia is independent of interest in the long run with non performing loans and the short run impact might be because of the less participation in the market and the dependents of the conventional banking system in other areas of functions. From the policy implications perspective it can be seen as a banking system, there is a potential chance for the Islamic banks in Malaysia to get escape from the interest rate fluctuations in their functions. It is also a good sign for the Islamic banks to show their ability of the independence with their efficient principles and products.

The one variable industrial production index which is the proxy for the GDP (LIPI) which had negative significant effect in the long run lost its statistical significance related to non performing loan rate in the short run. This finding is favouring the argument of the previous literature (Salas and Saurina 2002; Fofack, 2005; Jimenez and Saurina, 2006; Khemraj and Pasha, 2009; Dash and Kabra, 2010) which specifies that the industrial production take place only in the long run, and the nature of the variable is not in short term effects. Theoretically, In the long run the more GDP growth it will decrease the non performing loan in the market but negative growth in the GDP will increase the non performing loans. From this empirical result it can be find that there are no significant changes with conventional banks in terms of GDP growth and non performing loan rate. It also confirms the arguments that macro variables have

the same effect in long and short run on the non performing loans regardless the nature of the banking system.

The rest of the variable remained non significant as in the long run even in short run. It is interestingly seen that the dummy variable (CRISIS) which is proxy for the financial crisis 2007-08 remain statistically unchanged which implies that crisis could not make any impact both in short and long run on the non performing loan rate of the Islamic banks in Malaysia which is absolutely contradict with the actual result of other countries who has the system of Islamic banking. And it also contradicts with the previous literatures Khemraj and Pasha (2009) and Dash and Kabra (2010) on the conventional banks. From the empirical results it can be assume that the recent financial crisis has not affected the Islamic banks in the Malaysia in the area of nonperforming loan rate.

So far the discussion of the finding was based on the short and long run relation of nonperforming loan rate and the focus variable interest rate and other controlling variable. The main objective of the study is accomplished by this stage. But an add on to this paper it is indeed to discuss the relative exogeneity between the independent variable which helps the top level authority of the Islamic banks to make the decisions on the non performing loans rate. This study will helps the policy makers of the banks to make the decision to which variable should give relatively more consideration which should be in relative less consideration. So the study moves to the next step which is Variance Decompositions (VDC).

### **Variance Decompositions (VDC)**

Before getting in to the VDC it is indeed to specify the reason included the VDC step in this paper. Majority of the paper which carry the ARDL methodology does not use to carry this step. The main reason omission of this step is because of the contradicting value of the VAR order level between the automatic selection of the VAR order level to each variable by the ARDL approach and the VAR order level which use to get from normal VAR order selection. Fortunately in this study we got the VAR order level same which 1. So we continue to carry with VDC step. ARDL Although the error correction model tends to indicate the endogeneity/exogeneity of avariable, we had to apply the variance decomposition technique to discern the relative degreeof endogeneity or exogeneity of the variables. The relative exogeneity or endogeneity of avariable can be determined by the proportion of the variance

explained by its own past. The variable that is explained mostly by its own shocks (and not by others) is deemed to be the most exogenous of all.

Even though this step is not relevant according to the research question, but it is indeed relevant for the policy implication from the banker's perspective. As it is mentioned in the beginning of the study, the controlled variable which is included in the study is the blend of micro and macro variables in which micro variables (Bank's specific) are controllable by the bank. The proper analysis of this step will help the bank in significant policy consideration in the area of Non performance loan issue.

The study started out applying Orthogonalized VDCs and obtained some results but it is not shown in the paper because of There are two important limitations of orthogonalized VDCs. Firstly it depend on the particular ordering of the variables in the VAR, Secondly it assumes that when a particular variable is shocked, all other variables in the system are switched off. Generalized VDCs do not have these limitations so we decided to rely on it. We applied Generalized VDCs and obtained the following results.

**TABLE 9: Generalized VDC (5 year)**

VARIABLES	HORIZON	LNPL	LINT	LUEMP	LIPI	LINC
LNPL	20	72%	9%	8%	5%	6%
LINT	20	7%	70%	8%	12%	3%
LUEMP	20	9%	3%	63%	12%	14%
LIPI	20	11%	23%	2%	60%	4%
LINC	20	13%	4%	6%	8%	69%

**TABLE 10: Generalized VDC (10 year)**

VARIABLES	HORIZON	LNPL	LINT	LUEMP	LIPI	LINC
LNPL	40	74%	2%	11%	10%	3%
LINT	40	14%	64%	4%	15%	3%
LUEMP	40	9%	2%	61%	18%	9%
LIPI	40	9%	8%	2%	69%	12%
LINC	40	18%	4%	8%	12%	58%

The result shown in the table at the end of the forecast horizon 20 (5 year) and 40 (10 year), the contributions of own shocks towards explaining the forecast error variance of each variable are shown above. Out of this sample variance forecast results given by the generalized variance decompositions.

The table, at the end of the forecast horizon 20 (5 year) , the contributions of own shock towards explaining the forecast error relative variance of variable Non performing loans are as follows: Non performing loan (72%) interest rate(9%) unemployment,(6%) industrial production index(8%)growth rate of total loan(5%)

From the analysis, of the table which represent the relative variance in first 5 year of study, it is found that the most exogenous variable is Interest rate but when it comes to the result of the 10 year study the most exogeneity shifted from interest rate to Unemployment rate. Both the results are not contradicting with the previous underpinning theory and the previous literatures regarding the relationship between these variables with the Non performing loan. Most interestingly it is also proven in the empirical results in short run and long run relationship with these variables.

The implication of the result is even the shock of the non performing loan in the short run is explained mostly by interest rate (9%) excluding NPL itself. but in the long run the most exogeneity become the most endogenous (2%) which implies that in long run the changes in the non performing loan is least explained by the interest rate. the non performing loans in the Islamic banks in the long run is mostly explained by the unemployment rate excluding NPL itself which is common to both banking system (conventional and Islamic). It is also proven by the previous literatures.

As we seen in the first table that the most exogenous variable interest rate lost its relative exogeneity in the long run which implies that in the long run the Interest rate is able to explain only 2% of the changes in the non performing loan in the Islamic banks which is below to the all other variable. It can be seen in two dimensions which are from the conventional and Islamic finance point of view. Firstly, the fluctuations takes place in GDP (IPI) is long term in nature and the negative or positive effect of the fluctuations reflects in the non performing loans also reflects in the long run. It is very clear from the both table (shift from 5% 10%). Secondly, according to the principles of the Islamic banking, it is very known that the majority transactions are asset based. The result confirms with this concept since the proxy of the GDP which is IPI can represent the total industry product. The decline or incline of the IPI is clearly explaining the non performing loan of the Islamic banks in the long run.

From the both table, it is found that the relative variance of nonperforming loan with the shock in all other variables almost remains in moderate position among other variable in terms of the exogeneity and endogeneity except with the INC which represent the growth in total loan provided by the Islamic bank. The result implies that the changes in the total loan provided in the Islamic

banks in Malaysia is relatively more explained by the non performing loans. The result confirms with the previous literature which states that the policy of the banks regarding the total loan granting is depended on the non performing loan in the banks. If there is any trend of increase in the non performing loan in the market. The bank will tighten the loan approval policy and in vice versa. It will help the banks in the process of policy making and the rate of the non performing loan can be reduced in a certain extent.

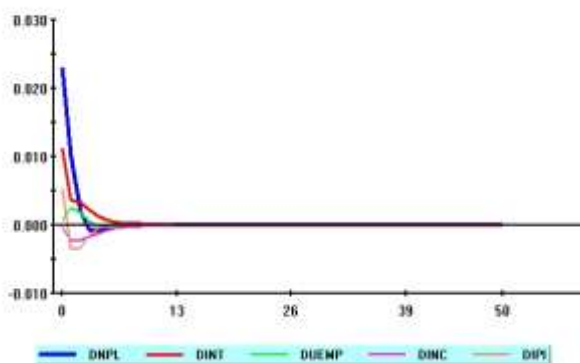
## IMPULSE RESPONSE ANALYSES RESULT

The impulse response functions (IRFs) essentially produce the same information as the VDCs, except that they can be presented in graphical form. We started out applying Generalized IRF and obtained the following results.

**Figure2**

VECTOR 1: IMPULSE RESPONSE FUNCTION WITH SHOCKS TO NON-PERFORMING LOANS (NPL)

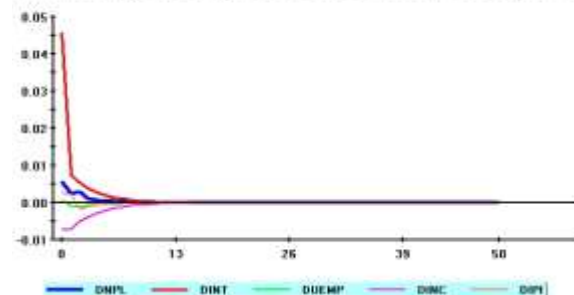
Generalised Impulse Responses to one SE shock in the equation for D



**Figure3**

VECTOR 2: IMPULSE RESPONSE FUNCTION WITH SHOCKS TO INTEREST RATE (INT)

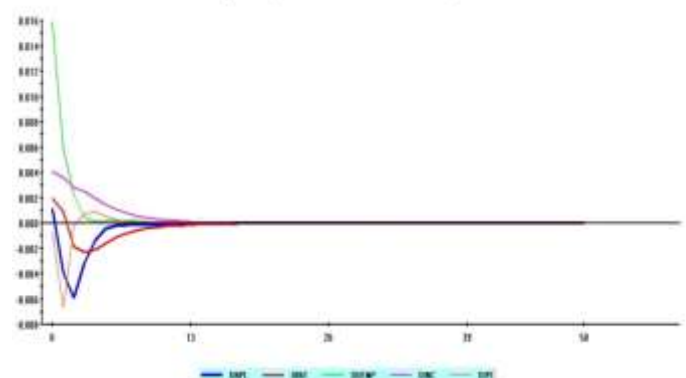
Generalised Impulse Responses to one SE shock in the equation for D



**Figure4**

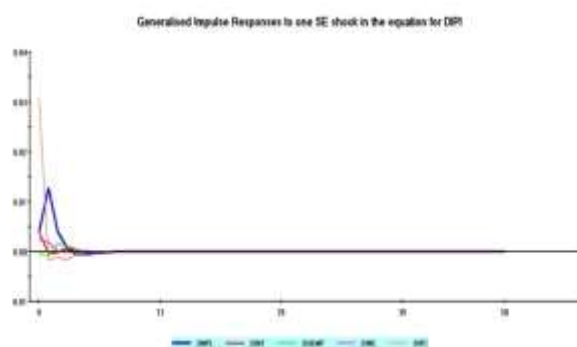
VECTOR 3: IMPULSE RESPONSE FUNCTION WITH SHOCKS TO UNEMPLOYMENT (UEMP)

Generalised Impulse Responses to one SE shock in the equation for DUEMP



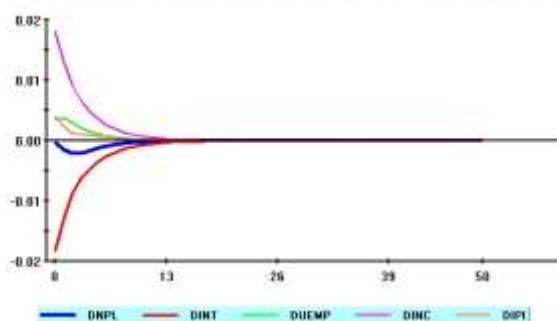
**Figure5**

**VECTOR 4: IMPULSE RESPONSE FUNCTION WITH SHOCKS TO INDUSTRIAL PRODUCTION INDEXES (IPI)**



**TOR 5: IMPULSE RESPONSE FUNCTION WITH SHOCKS TO TOAL LAON GROWTH RATE (INC)**

**Generalised Impulse Responses to one SE shock in the equation for D**

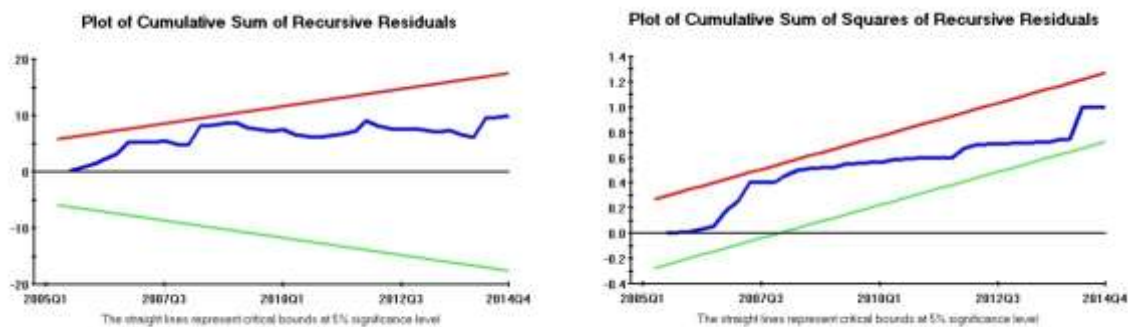


## CUSUM Test

As suggested by Pesaran (1997), the cumulative sum of recursive residuals (CUSUM) and the CUSUM of square (CUSUMSQ) tests proposed by Brown et al (1975) can be applied to the residuals of the estimated error correction models to test parameter constancy. The existence of cointegration does not necessary imply that the estimated coefficients are stable. If the coefficients are unstable the results will be unreliable.

The advantage of these tests is that, unlike the alternative Chow test that requires break point(s) to be specified, they can be used without the requirement of a priori knowledge of the exact date of the structural break(s). In both CUSUM and CUSUMSQ, the related null hypothesis is that all coefficients are stable. The CUSUM test uses the cumulative sum of recursive residuals based on the first observations and is updated recursively and plotted against break point. The test is more suitable for detecting systematic changes in the regression coefficients.

The CUSUMSQ makes use of the squared recursive residuals and follows the same procedure. However, it is more useful in situations where the departure from the constancy of the regression coefficients is haphazard and sudden. If the plot of the CUSUM and CUSUMSQ stays within the 5 percent critical bounds the null hypothesis that all coefficients are stable cannot be rejected. If however, either of the parallel lines are crossed then the null hypothesis of parameter stability is rejected at the 5 percent significance level.



The Figure7 and 8 which plot the CUSUM and CUSUMSQ tests, the plots of the CUSUM and CUSUMSQ statistics are generally confined within the 5 percent critical value bounds, indicating the absence of any instability of the coefficients. Thus, the parameters of the model do not suffer from any structural instability. The significant of this CUSUM and CUSUMSQ test in this study was to check if there any structural changes has taken place in the field Non performing loan due to the crisis. The figure shows that the crisis has not made any instability in the coefficients of the variables in the study. The insignificant results of short and long run coefficient of the CRISIS which shown in the previous tests also support this current results (CUSUM and CUSUMSQ) which is there is no impact of crisis on the period of the study. The result which got in this study is contradicting with the previous literatures and the findings which conducted over the conventional banks in Malaysia and other countries. It can be concluded that in Malaysia the CRISIS period has not made any structural change in the area of nonperforming loan rate in Islamic banks comparing with other conventional banks.

**TABLE 11: Diagnostic Test**

Test Statistics	LM TEST	P value
A. Serial correlation	CHSQ(4) 2.5148	(.642)
B. Normality	CHSQ(2) 3.1081	(.211)



C. Heteroscedasticity	CHSQ(1) .22222	(.637)
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Diagnostic test reveals that the estimation does not have the problem of auto correlation and Heteroscedasticity. Further it shows that the errors in the estimation are normally distributed. As a conclusion it can be said that the estimated model which is used for this study is correctly specified, unbiased and consistent. The result boosts the confidence of the statistical results which is revealed in the study.

## **Concluding Remarks and Policy Implications**

The prior literature attempted to examine the determinants of nonperforming loans but their scope of the study is restricted to the bounds of conventional banks. The current study on the issue is from a different perspective and focuses on the direct impact of interest rate on nonperforming loans in the Islamic bank which is theoretically and empirically diverse from the conventional banks.

The study employs ARDL approach to cointegration introduced by Pesaran and Shin (1999), and Pesaran et al. (2001) to examine the impact of interest rate on nonperforming loans in the Islamic banks in Malaysia for the period of 2005:Q1 to 2014:Q4. From the detailed theoretical and literature study it is found that most of the theories related to nonperforming loan rate connected with the interest rate are not applicable to Islamic banking. Therefore, there is a possibility that religious belief might play an important role in the banking decisions of Muslim customers. The empirical finding from the policy perspective is that the interest rate (KLIBOR) makes impact (positive) only in the short run and shows the insignificant impact (positive) in the long run. But this result should be read carefully because of small sample size and the small representation of Islamic banks in the overall financial sector. The statistical results imply that in the short run, the interest rate fluctuations impact on the changes in nonperforming loan growth in the Islamic bank, in the long run the interest rate doesn't have a significant impact. Comparing with previous literature on conventional banking, it can be assumed that the short term impact of the interest rate may be because of the general trend in the market regardless of the nature of the banking system and the long term insignificance of the interest rate may be because of the efficiency of the Islamic banks to deal with the interest rate fluctuation in the long run with appropriate policies. It is also found that there is no effect of crisis in the short and long run on nonperforming loans in this model which goes against the previous literature on the conventional banks and it can be

concluded that the Islamic banks were untouched by the crisis in the field of growth on performing loan due to the interest rate fluctuations.

The important step which helps the policy makers in an organisation which is variance decomposition (VDC) test found that in short run, the interest rate (KLIBOR) could explain relatively more fluctuations of the non-performing loans of Islamic banks in Malaysia than controlling variables (Unemployment, industrial production index and growth rate in total approval of loan). From the policy perspective of the Islamic banks, there is nothing that can be done to control the non-performing loans since the interest rate determination is out of the hands of Islamic banks. The only thing the Islamic bank can do in the short run is to tighten the credit policy by way of reducing the total loan approval. As the results show in the long run, IPI (proxy for GDP) could explain relatively more fluctuation of the non-performing loans of Islamic banks in Malaysia. From the policy perspective of the Islamic bank, it may be possible to take the policies influencing the development of industrial production which may lead to the GDP in order to reduce the non-performing loans, this policy can be treated as the general policy which can be initiated by all kinds of banks regardless of the nature of the banks (conventional and Islamic banks). From the model of the study, Islamic bank can only have the command over the total loan (micro-bank specific variable) since others are macro variables in which the banks do not have the control. The result in the VDC on the INC which represents the growth in the total loan approved by the Islamic banks in Malaysia shows relatively insignificant explanation power compared to other variables in the study on fluctuation in the non-performing loans and it can be concluded that the Islamic banks need to find out other micro (banks specific) variables which may be able to explain the fluctuations better than the INC which may become the extension of this study in the future.

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